

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Monitoring osseointegrated implant loosening

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Objective

This project aims to provide a mechanistic basis for early detection of implant loosening that combines (i) quantitative modelling of stress shielding by a high stiffness implant with (ii) its implications for contact conditions at the bone-implant interface, as well as (iii) identifying the vibration modes that provide the most judicious interrogation of the interfacial contact conditions, and hence the best prospect for early detection of implant loosening.

Project Details

This project aims to provide a mechanistic basis for the early detection of implant loosening based on high-fidelity modelling of the load transfer between bone and implant and of the consequent bone remodelling, as well as its implications for contact conditions across the bone- implant interface. This will feed into a systematic investigation of the linear and nonlinear vibration characteristics of a bone-implant construct, including a detailed understanding of interface tractions for various modes of vibration, as a basis for identifying the most promising modes for interrogating the bone-implant interface.

Prerequisites

MEC3455 & MEC3453